SUNY Poly EH&S Training

Cleanroom Safety

CNSE EHS Policy Statement

CNSE is committed to:

- Protecting the health and safety of it's employees, partners, customers and the public
- Protecting the environment
- Complying with regulatory standards

SUNY POLYTECHNIC Employee Responsibilities

- All individuals are responsible for safety at CNSE
- Take an active role in your safety and the safety of others
- Perform tasks in a safe manner
- Follow CNSE safety policies and procedures
- Understand the potential hazards you may be exposed to
- Contact your manager if you feel you need additional safety training

Cleanrooms & Hazardous Production Material (HPM) areas have a number of potential hazards such as...

- Physical and mechanical hazards (e.g., flammable, pyrophoric, compressed gases)
- Chemical exposures (e.g., Corrosives, Toxics)
- Electrical hazards
- Radiation
- Laser
- Ergonomics
- Slips/trips/falls

You may need additional safety training

Based upon your duties, you may need additional training such as:

- Arsenic Awareness Training (III-V materials)
- Compressed gas cylinder handling
- Electrical Safety
- Fall protection
- Hazardous Waste
- Laser safety
- LOTO
- Radiation safety
- Respiratory protection
- Others....

Discuss with your supervisor.

Refer to CNSE intranet site →EHS→ Training for more information. Contact CNSEEHS@sunypoly.edu to register for CNSE safety courses.

Some ways you could be exposed...

- Exposure can occur while working on equipment when you do not:
 - Turn off gases/chemistries and lock them out
 - Remove any residual pressure from lines
 - Wear adequate PPE to minimize exposure
 - Work with/on equipment that is faulty
 - Defeat safety interlocks



Always follow manufacturers' SOPs and obtain the necessary training to perform your work.

Safety Interlocks/Shields/Guards

- A safety interlock/shield/guarding is a means of safeguarding the employee from the hazard.
- Safety interlocks are designed to work together with hinged, sliding, or lift-off doors, guards and/or barriers.
- When the door/guard/barrier is opened, the power supply to the equipment it is guarding is disconnected.
- Example: Laser safety Interlock

DO NOT DEFEAT SAFETY INTERLOCKS

unless authorized to do so

Ensure that interlocks/shields/guards are restored after activity is completed

Control of Hazardous Energy (Lockout/Tagout) (LOTO)

- Used to prevent the release of hazardous energy (e.g., electrical, mechanical, chemical) during service or maintenance activities
- Employees must be authorized and trained in LOTO
- Do not defeat, tamper with, ignore, or operate any devices, or start up any machines or equipment that is locked or tagged out









Emergency Procedure Review

Fire/Smoke Alarm - White light, audible alarm, & voice enunciation



Evacuate the building and go to your rally point

Toxic Gas Monitoring System Alarm (TGMS) - Blue Lights (inside the building) and audible alarm- Evacuate via the nearest cleanroom exit (gowned)

- Regroup in:
 - NFS rotunda in NFS/NFSX
 - CESTM rotunda if in NFN, NFC, NFX, or CESTM

Only the CNSE TGMS Group is allowed to modify the TGMS system

- Jumpering out or disconnecting TGMS system is NOT allowed
- Some tool maintenance activities can trigger a false alarm blue light evacuation.
 - Some chemicals are cross-sensitive to gas sensor (e.g., IPA, adhesives, perfluorinated compounds like coolants)
 - Power cycling the tool
- There should be a tool-specific procedure in place to prevent false alarms. This may include using snorkel exhaust and/or placing the tool in maintenance mode before performing the work

Chemical Splash

Did You Know:

Showers/ eyewashes must be within a 10 second walk!!

- If you get any chemical on you
 - Immediately go to the shower/eyewash & activate
 - Remove any contaminated clothing
 - Wash for a minimum of 15 minutes
- A buddy should call security
- ERTs will respond and provide additional care and arrange transport to hospital

Chemical Spill - Significant

- Significant ≥ 1 pint or highly hazardous material
- Call Security
- Determine if anyone needs assistance
- Barricade area & alert others in the area
- Await for ERTs and Security in a safe area
 - Provide additional information
 - Obtain SDS if you can
- If you don't know what was spilled, call security

Chemical Spill – Small

- ** Applies only to chemicals that are of low hazard for which you have had training**
- < 1 pint</p>
- Have needed equipment and PPE
- Collect material and place in hazardous waste bag
- Label debris and put in satellite accumulation area
- If unsure Call Security!!



Chemical Odors in the Cleanroom

- People can smell certain chemicals at low levels before they reach an occupational exposure limit (e.g., solvents)
- Conversely, some chemicals can be at dangerous concentrations with no odor at all (e.g., CO)
- If you feel any symptoms you believe are work-related, remove yourself to fresh air and call security
- ERTs will respond to provide additional care and investigate the odor source

Emergency Reporting

- REPORT to security at 518-437-8600 and to your manager
 - Any injury, accident, illness, fire, medical emergency or chemical spill
 - Any work-related symptoms of exposure

Chemical Labels

- Chemicals from suppliers must be labeled
- Do not remove or deface manufacturer's labels
- Secondary containers must be labeled with chemical name and hazard warnings

Flammability Health 4 2 Reactivity Special Hazards

Acetone





Danger!

Highly flammable liquid vapor. Causes severe eye irritation.

Keep away from heat, sparks and flame – No smoking. Take precautionary measures against static discharge. Keep from direct sunlight. Keep container closed when not in use. Store in a cool/low temeprature, well-ventilated place away from heat and ignition sources. Use only in a well-ventilated area. Avoid contact with eyes, skin and clothing. Wear appropriate personal protective equipment, avoid direct contact.

IF CONTACT WITH EYES: Flush eyes with water for at least 15 minutes while holding eyelids open.

In case of fire, use water spray, fog or mist. Dry chemicals. Halon. Powder, foam or CO2.

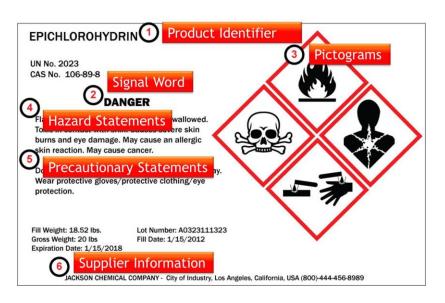
See Safety Data Sheet for further details regarding safe use of this product.

ABC Company, Main Street, Anytown, NJ 00000, Tel: 555 123 4567

Globally Harmonized System (GHS) for Hazard Communication Labels



Quick GHS Refresher



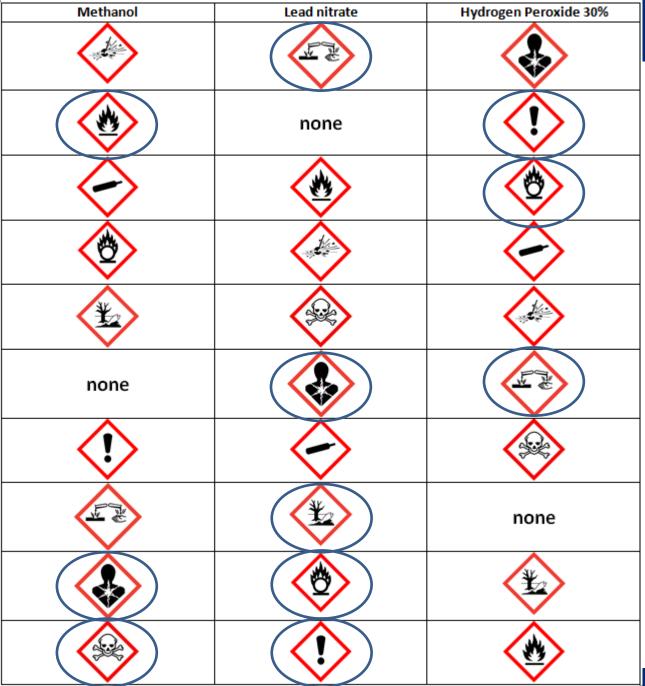
Quick pictogram activity:

Match the pictogram wording below with the correct pictogram image in the table on the right.

Chemical	GHS Pictogram
Methanol	Flammable, acutely toxic (cat 3), target organ toxicity
Lead nitrate	Oxidizer, acutely toxic (cat 4),target organ toxicity, reproductive toxicity, serious eye damage, aquatic toxicity
Hydrogen peroxide 30%	Corrosive, oxidizer, acute toxicity (cat 4), serious eye damage

GHS Physical Hazard Pictograms						
Flammable	Oxidizers	Corrosives	Explosives	Compressed		
				Gases		
S	Specific physical hazards included in this pictogram group					
-Flammables	-Oxidizers	-Corrosive to	-Explosives	-Gases under		
-Pyrophorics		metals	-Self-reactives	pressure		
-Self-heating			-Organic			
-Emits			peroxides			
flammable gas						
-Self-reactives						
-Organic						
peroxides						
GHS Health Hazard Pictograms						
Corrosives	Skull &	Health	Exclamation	Environmental		
	Crossbone	Hazard	Point			
				¥2		
Specific health hazards included in this pictogram group						
-Skin	-Acute toxicity	-Carcinogen	-Irritants (skin	-Aquatic toxicity		
corrosion/burns	(fatal or toxic)	-Mutagen	and eyes)	(based on LC50 for		
-Serious eye	(category 1,2,3)	-Reproductive	-Skin sensitizer	fish)		
damage		toxicity	-Acute toxicity			
		-Respiratory	(category 4)			
		sensitizer	-Narcotic			
		-Target organ	effects			
		toxicity	-Respiratory			
		-Aspiration	tract irritant			
		toxicity				

SUNY



Obtaining Chemicals

- **Approved Chemical List**
 - On EHS Intranet Site
 - Use the Hazmin Database
- Chemical Approval Process
 - All chemicals must be approved by EHS before purchase
 - Approvals are specific to that location/tool
 - Complete online form (through Hazmin Database)
 - Provide SDS, volume, location, etc.
 - If your chemical is new to the tool, you will need to complete the New Equipment/Modification/Process Change Checklist – Refer to EHS-00016-F1
 - If your chemical requires a tool modification, you will need to go through equipment commissioning procedure ("green book") – Refer to EHS-00017



Approved Chemical List Training **Audit Schedule EH&S Committees** Metrics Standards and Regulations FAQ Contacts

This site has been co and resources that a

This site also provide policies and procedu hazards to the Alban

We hope the navigat

Environn

Safety Data Sheets

- Provides information on the chemical including:
 - Physical/chemical properties (pH, flash point, etc.)
 - Toxicity data
 - Storage and shipping requirements, incompatibles
 - Required PPE
 - Emergency response procedures
 - NFPA codes
- Are available 24/7 through Hazmin
- Paper copies available in EHS office
- SDSs are also searchable on the internet manufacturer websites

Physical and Chemical Hazards

- Flammable
- Pyrophoric
- Peroxide-formers
- Oxidizers
- Irritants
- Sensitizers
- Corrosives (acids, bases)
- Toxics (poison)
- Asphyxiant
- Carcinogens, Teratogens, Mutagens



SUNY POLYTECHNICHow Can You be Exposed?

Ingestion: Eating

Inhalation: Breathing in through the mouth or nose

Injection: Needle stick or into a cut, directly into

bloodstream

Absorption: Contact with the skin or eye

We have engineering controls, administrative controls and PPE to protect you in the presence of potential hazards at the CNSE





Flammable

- Based on its flashpoint
- The lower the flashpoint, the easier it is to ignite the material
- Keep away from heat, ignition sources, and strong oxidizers
- Store flammable material in flammable storage cabinets
 - Must be self-closing, grounded, and labeled:

"FLAMMABLE - KEEP FIRE AWAY"



- Storage of flammables must not obstruct any exit
- Use only *explosion proof refrigerators* certified by the manufacturer for storing flammable material. They must also be labeled:

NOTICE

FOR CHEMICAL STORAGE ONLY
DO NOT STORE FOOD OR BEVERAGES IN THIS REFRIGERATOR

Pyrophorics

A substance that spontaneously ignites in air at temperatures at or below 130° F

Examples: silane, tributylaluminum

- Store pyrophoric chemicals away from sources of ignition and flammables
- Many pyrophoric chemicals also release toxic and flammable gases
- Pyrophoric liquids shall be transported on a cart with the ampoule inside a metal container/housing.
- Pyrophoric containers must be properly labeled and include the contact name



Pyrophoric Deliveries

- Pyrophoric deliveries are only allowed between 9AM and 3PM, M-F
- During deliveries to and from the tool, the tool engineer and Air Liquide must coordinate a direct hand-off of the pyrophoric
 - Once received, it must be transported directly to the cabinet and installed immediately
- The maximum quantity of pyrophoric liquid allowed at any single workstation is 0.5 gallons
- Refer to procedures in EHS-00005 Chemical Handling and Storage Procedures for more requirements

Oxidizers



- Substances that initiate or promote combustion in other materials
 - Chlorine
 - Chlorine trifluoride
 - Hydrogen peroxide
 - Oxygen
 - Concentrated nitric acid (>69%)

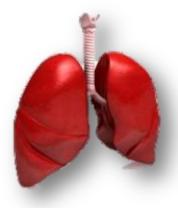
CAUTION
Avoid storage next to flammables!



Irritants

- Produce inflammation of tissue upon contact
 - On your skin
 - If you breath an irritating chemical vapor, gas, or mist
- Short term exposure to an irritant is generally reversible once the irritant is removed







Sensitizers

Cause allergic reactions (sensitization)

- Dose related
- Can cause you to develop an allergic response which could be immediate or delayed (several weeks or months depending on individual)
- Can be severe or fatal
- Examples:
 - ✓ Latex gloves
 - √ Formaldehyde
 - ✓ Diesel Fuel



Corrosives

Determined by pH and concentration (see SDS)

Corrosives are destructive to human tissue.

Severity of damage depends on concentration

of corrosive

Severe exposure may cause permanent damage

Wear gloves, eye and face protection when handling corrosives

FIRST AID - Flush a minimum of 15 minutes

Acids and bases MUST be segregated for storage. Use plastic trays, tubs or buckets for separation within the cabinet

	Substance	рН
	Battery acid	0.5
HF —	Gastric acid	1.5 - 2.0
	Lemon juice	2.4
	Cola	2.5
	Vinegar	2.9
	Orange or apple juice	3.5
CORROSIVES A TOTAL	Beer	4.5
	Acid Rain	<5.0
	Coffee	5.0
	Tea or healthy skin	5.5
	Milk	6.5
	Pure water	7.0
	Healthy human saliva	6.5 – 7.4
	Blood	7.34 – 7.45
	Sea water	8.0
	Hand soap	9.0 - 10.0
MAH –	Household ammonia	11.5
	Bleach	12.5
	Household lye	13.5

Toxics

Able to cause illness/disease, injury, death

Skull & Crossbones
Acute Toxicity
Category 1, 2, or 3

Category 1, 2, or 3



- Includes:
 - Carcinogens
 - Mutagens
 - Organ Toxicity
 - Reproductive Toxins
 - Teratogens
 - Sensitizers



- Everything can be toxic!
 - The dose makes the poison

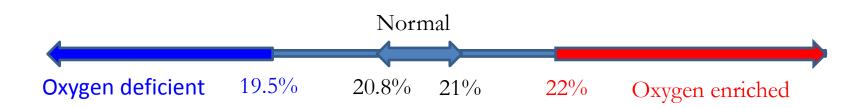


Asphyxiants

Simple Asphyxiants - Displaces oxygen (e.g., N2)

Chemical Asphyxiants - Interfere with O₂ delivery

- Can have other hazards (flammable)
- Can also be odorless (e.g., carbon monoxide)



Carcinogens

- Agents that produce or accelerate the development of malignant tumors
 - Can remain dormant for up to 40 years
- Contributory factors include:
 - Lifestyle diet, smoking and alcohol (80-90%)
 - Chemical exposure level
 - Genetics
 - Age
 - Sex
 - Hormone levels
 - Immunologic (AIDS)

Hydrofluoric Acid (HF)

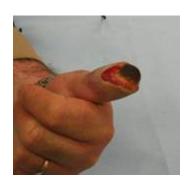


- Causes deep, painful, slow-healing burns
- Burns may not be apparent for up to 24 hrs.
- Fluoride ion destroys soft tissue & decalcifies bone
- Call Security if you think you were exposed to HF
- ERTs have calcium gluconate to treat skin contact

Day 1



Day 6



Day 12



90 Days



Tetra Methyl Ammonia Hydroxide (TMAH)

- Causes injury or death from skin contact at or above 1% TMAH in water
- CNSE uses concentrations from <1 % up to 25%
- TMAH is <u>corrosive</u> to the skin, eye, and upper respiratory tract
- TMAH can be highly toxic and fast-acting

Signs and symptoms

- 2nd to 3rd degree burns of skin
- Irregular breathing and heart beat
- Progressing to coma, shock and, in most cases, death

Follow the SOP and hazard assessment; use appropriate controls and PPE to prevent exposures

If you are pregnant or intend to start a family

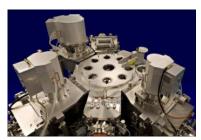
- Be especially careful to avoid contact with chemicals, particularly those that are reproductive toxins or teratogenic
- If you are concerned, consult your physician and supervisor
- Some reproductive toxins can have adverse affects on males

Transporting Hazardous Production Materials (HPMs) within CNSE

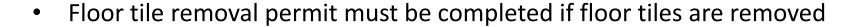
- Liquid HPM transport requires secondary containment when outside their DOT shipping container
- Incompatible chemicals cannot be transported together on the same cart
- Only specific transport routes can be used for HPMs
- Passenger elevators should never be used to transport HPMs in buildings where chemical elevators are available (NFN, NFX, and NFC)
- Two qualified persons are required for transporting HPM chemicals in elevators. No on is to ride in an elevator with HPM chemicals
- Do not transport any chemicals in personal vehicles
- See EHS-00005 Chemical Handling and Storage for requirements

Chamber Opening Guidelines

- Ensure that proper notifications (Equipment support team, Security, etc.) have been made and permits completed, and all applicable procedures are followed
- Ensure tool/equipment has been placed <u>maintenance mode</u> and <u>notify security</u>



- Use appropriate control measures:
 - Barricading (10' perimeter of tool)
 - Use snorkel exhaust or other forms of local exhaust ventilation
 - Personal protective equipment



Ensure proper housekeeping and cleanup /disposal of contaminated waste materials

Pouring Chemicals Guidelines

- Know the hazard before using a chemical (review SDS)
- Use appropriate PPE; barricade the area
 - Gloves, safety glasses/goggles, arm guards, apron, faceshield
- Pour chemical in a fume hood or with local exhaust ventilation
- If pouring larger quantities (>5L); use peristaltic or hand pump
- If mixing solutions- ensure that the chemicals are compatible and establish mixing protocols/procedures
- Don't eat or drink when handling chemicals always wash your hands afterwards



Work Alone Policy

- A "Buddy" is required when working with highly hazardous materials (e.g., TMAH, HF, pyrophorics) or on high hazard equipment (refer to EHS-00045 Working Alone Policy)
- Buddies should help each other in case of exposure/emergency
 - Help victim to emergency shower/eye wash
 - Call the emergency number
- Supervisor will determine when a "Buddy" is needed

Floor Tile Removal Requirements

Floor Tiles



Due to fall hazards (people, items), you must follow floor tile removal procedures

- Floor Tile Removal Approval Permit (found in gowning room)
- It must be approved by the Cleanroom Coordinator

Waffle area

18 foot drop

Don't forget to wear your hard hats in the subfab!

You must use barricades when removing a floor tile

Used to communicate the fall/trip hazard to others working in the area.

Barriers must be placed at least one floor tile width away from the opening.

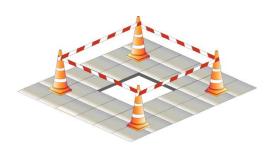
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Soft Barricades

 A hard barrier must be used when removing floor tiles in the NFN and NFC cleanroom where a fall of >6 feet is possible.

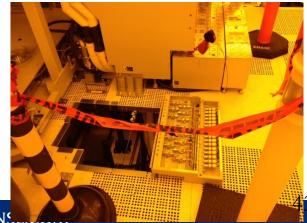


- Soft barriers consisting of chains or 'caution' tape and cones can be used in the NFN sub fab and NFS/X cleanroom
- Soft barriers can <u>only</u> be used where a fall hazard <u>does not</u> exist.





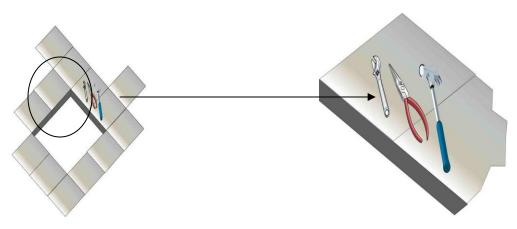
Improper barricades:
Left unattended
No Hard Barricades
> 6ft drop



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WWW.SUNYCNS

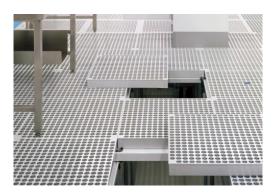
Tools at the Opening



- A tether must be used in NFN&NFC cleanroom to prevent tools from falling, if such a fall potential risk exists, such as:
 - Floor tiles situated above high risk utilities (gas, water, and electric's)
 - Floor tiles situated over a waffle slab above a sub floor where there is a drop of more than six (6) feet.

Waffle Covers

- Employees working in the waffle area can use waffle covers (diamond steel or aluminum plates) to cover the waffle floor openings OR have to be tied off (fall protection harness)
- Waffle covers should be placed so they can not be moved and they leave no openings more than 1 inch wide.
 - Hand tools do not need to be tethered
 - Employees working in the area only have to wear a harness to secure/remove the waffle covers





Head Protection



Hard Hats – Required in the NFN/NFC Subfab

Bump Caps

 Not allowed where hard are required



Eye and Face Protection

- Safety Glasses are always required when working in the cleanroom or lab areas
 - Side shields
 - Z-87
- Goggles



Face shield



If you get chemicals in your eye, start rinsing immediately

Foot Protection

- Steel Toe
- Rubber or Chemical
- Shoes must be ASTM approved (ASTM F2412-11)
- Required for:
 - Gas Cylinder Handling
 - Chemical Handling
 - Shipping/Receiving
 - Facilities Maintenance
 - Electrical Hazards,
 - Hot, Corrosive, Toxic Substances,
 - Falling, Crushing, or Penetrating Objects



- While working in Cleanroom and Lab areas shoes must have
 - Closed heels and toes
 - Heel height <2"
 - Heel base at least ½"
- Chemical areas:
 - Soles must be non-porous and impervious
 - NO open toed shoes

Hand & Body Protection

Many different materials and styles





Tyvek suit



Be sure you know that the material will protect you against the hazard & that it is not damaged or defective!!

Gloves / Sleeves

Sharp objects/Cut resistant: Leather, Kevlar

- Chemical Resistant Tri-polymer blend of nitrile, neoprene and natural rubber— used for MOST (not ALL) acids, bases, or solvent mixtures
- Example: Employee needs to hand pour 200 mLs of 96% sulfuric acid into a bath.
 What glove material could s/he use? To find out go to: http://www.mapa-pro.com*

HF Incident in subfab

- A worker was working in the subfab on a line that contained hydroflouric acid (49%), nitric acid, and acetic acid (1:1:1).
 The worker believed the line was locked out but it wasn't
- He broke the line to do PM work but the line was still pressurized and a liquid sprayed under his face shield to the side of his face
- He was wearing face shield, gloves, safety glasses, apron
- There was a buddy nearby who was able to get him to the shower immediately and call security
- The ERT responded, showered him and applied calcium gluconate. He was transported to Albany Med for observation

HF Incident in subfab - Findings

- Patient suffered no injuries
- A buddy was present which allowed for immediate action to rinse off the worker and call security for help
- Should have worn safety goggles vs. safety glasses
- Proper hazardous energy procedures were not followed

 the worker should have checked himself that the line
 was de-pressurized and locked out
- Proper PPE was worn but the employee still suffered chemical exposures – Think ahead: what hazards can I face? What could go wrong? What can I do to minimize risk?

No line of defense is 100%, always think ahead



Waste Management



Hazardous Waste



Non-hazardous Waste



Universal Waste



Other Exempt Waste

- Waste disposal is the responsibility of the generator
 - Generator: Any person whose act or process creates hazardous waste.
- No waste goes down the drain or in the trash
- All waste goes to the designated SAA (Satellite Accumulation Area)

Contact EHS with any disposal questions: CNSEEHS@sunypoly.edu

Kassey Brust – Hazardous Waste Tech

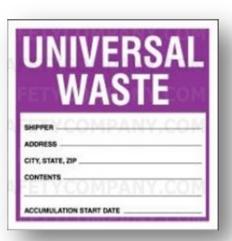
Non-Hazardous Waste

- Does not meet the EPA Haz Waste criteria
- Do not pour down drain or put in trash
- Label with "Non-Haz" Label and put in SAA



Universal Waste

- Batteries, Lamps & Mercury containing devices ONLY
- Label and put in SAA
- Indicate type of items (i.e.bulbs) and date



Hazardous Waste

EPA Characteristic Hazardous Waste

- Ignitable (FP <140° F)
- \circ Corrosive (pH \leq 2 or \geq 12.5)
- **Reactive** (e.g., can react w/ H₂O to form gases)
- Toxic



Hazardous waste containers/bags:

- Must be <u>Labeled</u>
- Good condition
- Closed at all times (no funnels)
- Waste is compatible with container
- Incompatibles must be separated!





How to complete a Hazardous Waste Label

- Check <u>Type</u>: SOLID or LIQUID or MIXED
- Check <u>Hazard</u>: IGNITABLE, CORROSIVE, TOXIC or REACTIVE
- START DATE: the date you first put waste into the container.
- **FILL DATE**: the date you place the **full** container in the satellite accumulation area.
- Write NAME of person responsible for generating waste and their department.
- CONTENTS: Name of the chemical(s) that makes the waste hazardous

HAZARDOUS WASTE		
ACCUMULATION (Check box if satellite □)		
□ Solid Waste □ Liquid Waste □ Mixed Waste		
□ Ignitable (Flashpoint < 140°F)		
□ Reactive □ Toxic		
☐ Corrosive (pH<2.0) or (pH>12.5)		
Start Date// FIII Date//		
Contact Name: Department/BulldIng/Tenant:		
Chemical contents (product name or major chemical component):		
HANDLE WITH CARE! CONTAINS HAZARDOUS OR TOXIC WASTES		

Satellite Accumulation Areas



- Place properly labeled waste in the satellite accumulation area
- Needs to have spill containment
- Only 1 container per waste stream (max of 55 gallons)
- Move to 90-Day Storage Area within 3 days of being filled
- Use different shelves or secondary containers for different waste streams to keep incompatible waste apart

Satellite Accumulation Areas (Refer to EHS-00009, Attchmt 5 for full list)			
NFN/NFC fab	NFS/SX fab	NFN Chem Mix rm	
NFN Sematech fab	NFX fab	HPM Corridor	
Chem passthrough	N-208	SGF01	
NFN subfab	SNW03 Spill Containment	NFX gowning rms 205, 208, 216	

Empty Container Guidelines



- Empty bottles that once contained flammable/solvents should be placed in dedicated, labeled bins located in:
 - NFN Fab level tool move-in area
 - NFN & NFC Subfab level tool move-in areas
 - NFSX loading dock
 - NFX Fab tool move-in area
 - NFN HPM corridor
- MUST be capped before placing into the correct bin.
- Nowpak containers should not be placed in bins, must treat them as Hazardous Waste
- Other trash should <u>not</u> be placed in these bins.

What's wrong with this picture?



What's Wrong with this Label?



No ingredients, pH not circled or written in, no name!

Ladder Safety

- Use a ladder only on a stable and level surface
- Always inspect the ladder for damage prior to using it
- Always maintain a 3-point (two hands and a foot, or two feet and a hand) contact on the ladder when climbing.
 Keep your body near the middle of the step and always face the ladder while climbing (see diagram)
- Do not use the top 2 steps/rungs of a ladder as a step/rung unless it was designed for that purpose
- Do not use a self-supporting ladder
 (e.g., step ladder) as a single ladder or in a
 partially closed position



SUNY POLYTECHNIC Ergonomic Lifting Guidelines

- The safe lifting zone is between the knees and shoulders
- Push items rather than pull them
- Bend at the knees, not the waist
- Keep the load close to the body and use both hands
- DO NOT Twist

Use a step ladder for all lifts above shoulder height





EHS Intranet



H1N1 Flu (Swine Flu)

Policies, Procedures, &

Forms

Approved Chemical List

Training

Audit Schedule

EH&S Committees

EHS - Ergonomics

EHS - Resources

ERT

Metrics

Standards and Regulations

FAQ

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Welcome to the CNSE Environmental, Health and Safety (EH&S) Intranet Webpage!

This site has been created to provide you with access to information on the EH&S services and resources that are readily available for you at the CNSE Facility.

This site also provides links to important regulatory requirements, as well as to all the EH&S policies and procedures that have been developed and implemented to assist in reducing hazards to the CNSE and University communities.

We hope the navigation is intuitive and the information useful!

Environmental, Occupational Health and Safety Policy Statement

CNSE is committed to protecting the environment by aggressively and proactively ensuring consistent compliance with existing environmental regulations. CNSE is committed to protecting the health and safety of it's employees, partners, customers and public by proactively ensuring consistent compliance and striving towards continual improvement. CNSE endeavors to go beyond minimum compliance with regulatory standards to achieve excellence in environmental, health and safety management practices.

SAFETY FIRST

If you have any questions, contact CNSE EHS at CNSEEHS@sunypoly.edu



Cleanroom Protocol Training

SUNY POLYTECHNIC INSTITUTE CNSE

2016

Objective of Cleanroom Protocol Training:

To define the general protocol requirements for the wafer processing areas in all CNSE cleanrooms.

Intended Audience for this Training:

All individuals provided with badge access to the CNSE cleanrooms.

All persons who work in the cleanroom are required to receive CNSE Hazard Communication Refresher, Site-Specific Safety Training and Confidential Information Management training.

Human Factors:

- Most important concern = People generate particles
- Humans are the main source of wafer contamination.
- Proper awareness and behavior are required to control particles and minimize wafer contamination

Please remember, "We control the particle levels!"

Entering all Cleanrooms:

Only authorized, trained employees, partners, subcontractors, or guests are allowed to enter any of the cleanrooms:

- NanoFab South (NFS) and South Annex (NFSX)
- NanoFab North (NFN) and Central (NFC)
- NanoFab X (NFX)

Related Compliance Issues:

- Floor Tile Removal Approval forms must be submitted and authorized by the Area Manager prior to opening up floor tiles.
- Dirty Work Permits must be completed and approved by Cleanroom Supervisor prior to opening doors to outside environment, or creating a potentially contaminating work environment.

Pre-Entry Activities:

Ensure all items being carried into the Cleanroom are approved for use (tools, equipment, handling carts, spare parts, writing utensils, computers, consumables).

Ensure that approved items are wiped down prior to entry with a solution of 10% IPA and 90% DI H₂O, while wearing gloves and safety glasses.

Anything bigger than a laptop must enter cleanroom through Material Pass-through and be wiped down



CNSE & Partner management shall ensure:

Those who enter the cleanroom MUST...

- Be trained and properly gowned before entering the cleanroom
- Minimize traffic through the entrance/ exit doors
- Clean equipment and materials before entering the cleanroom
- Keep personally clean particularly hands, face, and hair
- Do not touch face with gloves
- Minimize use of cosmetics and perfumes
- Use knife or scissors to open bags
- Use cleanroom approved paper, notebooks, ball-point pens, and tape
- Use telephone for communication. Attach cell phones on outside of garment

Those who enter the cleanroom MUST NOT:

- Bring in regular paper, cardboard, Styrofoam, bubble wrap, paper towels, or scotch tape in cleanroom
- Touch vacuum surfaces, chambers, equipment, or wafers without gloves
- Bring wooden tool boxes, wooden-handled tools into cleanroom
- Bring cigarettes, matches, lighters, tissues, or combs, into cleanroom
- Walk rapidly, or move unnecessarily (try to minimize air disturbance)
- Chew gum or tobacco, smoke, eat, or drink in cleanroom or clean areas

Those who enter the cleanroom MUST NOT:

- Unfasten cleanroom garments in cleanroom
- Carry materials into the cleanroom without prior cleaning
- Pick up and use tools or materials off the floor, without prior cleaning
- Slide material, equipment, or products on the floor, cabinets, or equipment
- Open emergency exit doors unless there is an emergency
- Use hydrocarbon-based aerosol cans
- Allow rust, oil, or peeling paint on tools or boxes
- Allow impact-type printers, non-cleanroom paper, or pencils
- Whistle, cough, or sneeze persistently

Determine size prior to donning:

Garment: Fasten all snaps & zippers. Hang on dedicated hangers after use.

Inspect garments for damage before donning. If damaged, do not wear and hand it to the Cleanroom personnel.

Dispose after use:

Shoe covers: Use to prevent excessive dirt contamination; Wear inside of pull-up boots.

Beard Cover: To be worn by those with facial hair (mustache, beard)

Hairnet: Tuck all hair inside of hairnet

Cleanroom gloves: Tuck gloves under the garment wrist band.

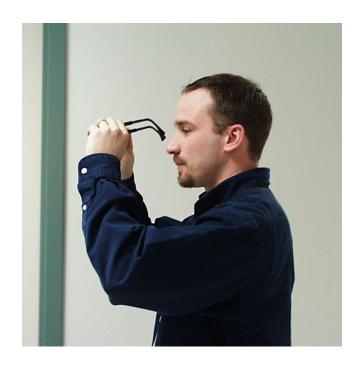
NOTE: When performing operations that could affect the quality of the processed wafer, you must wear a hairnet, hood, and beard cover



Entering the NFN/NFC and NFX Cleanroom:

Only authorized, trained employees, partners, subcontractors, or guests are allowed to enter the cleanroom areas!

1. Put on safety glasses first.



2. Clean off street shoes in the shoe brush vacuum to remove large particles.



3. Walk on tacky mat. (Picture not shown).

4. Wipe down items to be taken into cleanroom.

WIPE DOWN TOOLS,
HARDHATS, Etc...
BEFORE ENTERING
GOWNING AREA
Thank you.



5. Pick up shoe covers. Sit on bench with feet on "outside". Place shoe covers on shoes, one at a time.



6. Put on gloves.

- 7. Put on hairnet. Contain all hair.
- 8. Put on beard cover. Cover all facial hair. (mustache / beard).







9. Put on hood



10. Put on garment. Do not allow upper garment to touch the floor while dressing.



- 12. Place badge and cell phone outside of garment
- 13. Inspect gowning attire.
 Verify containment of hair.
 (Picture not shown.)
- 14. Enter cleanroom, moving slowly.





SUNY POLYTECHNIC EXITING THE CLEANROOM

Take garment off
Do Not let top touch ground

Hang garment up on dedicated hangars



Discard Hairnet/Beard Cover & Booties



All disposable items (hairnets, shoe covers, and gloves) are to be discarded at the exit of the cleanroom area.

Take care not to remove shoe covers near entry path: minimize dirt transfer to the entrance zone.



In case of an emergency, do not remove cleanroom garments until after evacuating and reaching a safe location.

- Blue (gas) Light alarms → report to the rotundas (depending on what fab evacuated). Cleanroom staff will collect garments in rotundas
- White (fire) light alarms → report to your rally point. Upon return, hand garments to the Cleanroom staff

PROCEDURE FOR GOWNING IN NFS/NFSX are slightly different from NFN and NFX

- 1. In NFS/NFSX, you need to wipe down equipment before using shoe cleaner
- In NFS/NFSX, no hood is required

EXITING THE NFS/NFSX CLEANROOM

- 1. Hang garment up on assigned hanger and exit gowning room.
- 2. Keep the disposable items (hairnets, shoe covers, and gloves) ON until you reach the beginning of the viewing corridor entrance area, where they can be discarded *Take care not to remove shoe covers near entry path: minimize dirt transfer to the entrance zone.*



FOUP Handling Guidelines



FOUPS are Front-Opening Unified Pods for safely transporting 300 mm wafers between tools and clean product environments. Always remember to:

- Handle with care
- Never carry more than one FOUP at a time
- Writing on FOUPs is prohibited
- Return defective FOUPs to the Cleanroom Coordinator for disposition
- Open FOUPs only in a clean hood or approved clean product environment
- Never handle wafers inside FOUP manually
- Never exchange FOUPs of different color as this will create cross-contamination



Questions?

Contact Information:

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